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ABSTRACT

The susceptibility to faking on the Tennessee Self Concept Scale was examined among college students. Additionally, groups of respondents, instructed to respond in a "random" fashion to pre-determined numbers of items in the TSCS, were subjected to a plausibility analysis of their test response vectors using the Rasch measurement model. Respondents included in the study totalled 352 and were students enrolled in education courses in a southern state university. Results of the investigation provided evidence of the proneness of the instrument to deception under certain situations. Moreover, statistical indices useful in the detection of aberrant data records for individual cases were provided. (Author/BMW)

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# Deception in Testing: An Investigation of the Tennessee Self Concept Scale

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# Deception in Testing: An Investigation of the Tennessee Self Concept Scale[1]

During the last several decades, the professional literature relative to the study of self-concept and its linkage to achievement outcomes has increased steadily. Likely, this increase in interest in the self-concept, whether viewed as an antecedent or consequent variable in the explanation of achievement outcomes, is related to the shifting focus away from solely cognitive development to the affective growth of children in the educational setting. Coupled with this burgeoning research interest in the self, however, many questions and criticisms have been raised regarding both the definition and the interpretation of measurements of the self-concept (Shavelson, Hubner & Stanton, 1976). In short, the collective body of research literature in the area of self-concept today remains in much the same condition that Crowne and Stephens (1961) and Wylie (1961) discussed 18 years ago. That is, research on the self-concept has addressed itself to substantive and theoretical problems before resolving the problems associated with its methods of measurement.

While instrumentation in research on the self-concept has followed a variety of forms (Wylie, 1961, 1974), most instruments that have been used in educational research and evaluation have relied upon a paper and pencil self-report format. The extent to which self-evaluative responses are influenced by social desirability variables

has been shown to be a limiting factor in the interpretation of results obtained from such tests (Crowne & Stephens, 1961). Moreover, interpretations of scores on self-concept instruments have been challenged on the grounds that some respondents may be either unable (Snygg & Combs, 1949) or unwilling (Cronbach, 1970) to report their "private" self-concepts.

The Tennessee Self Concept Scale (TSCS: Fitts, 1965) is one of the more widely used instruments among those which have been developed to assess an individual's conception of him/herself. Since the development of the TSCS by Fitts, over 1,000 research studies reporting its use have appeared in the professional literature. The instrument yields 29 sub-scores and a composite profile and is easily scored through the use of a simple computer program (e.g., Garrison & Stanwyck, 1978). The TSCS is based upon a conceptualization of the self-concept which is multi-faceted, including both internal and external dimensions of behavior.

While many of the measurement studies of the TSCS have been directed toward an elucidation of its validity and clinical applications, relatively few studies have been concerned with situational variables and their effects on TSCS scores. Yet, the effects of response distortion on test validity attributable to situational variables such as response style, dissimulation and deceitfulness has been recognized as a potential problem area in psychological testing. Perhaps even more important than the recognition that such problems affect test validity, however, is the

need to identify their occurrences in individual test cases.

The purposes of the present study were: (1) to examine the susceptibility of the TSCS to falsification due to both "faking" (dissimulation) and "sleeping" (random response patterns); and (2) to develop a classification procedure for the detection of misrepresentation and/or implausible test response patterns for individual test cases. A review of measurement research on the TSCS (in Fitts, Adams, Radford, Richard, Thomas, Thomas & Thompson, 1971) indicated that these issues have received little attention. To accomplish the objectives of the investigation, the study utilized recent developments from the field of latent trait test theory and the methodology of multiple discriminant analysis.

## METHOD

### Examinee Population

The respondents in this study consisted of 352 male and female graduate students enrolled in education courses at Georgia State University. All examinees responded anonymously to the TSCS.

### Procedure

The TSCS was administered under group testing situations to all examinees. Under one condition, instructions for responding to the test items followed those of the test publisher with only minor modifications to accommodate a non-standard response sheet ($n_1$=166). Two other conditions utilized a set of instructions requiring the

respondents to falsify their responses in a negative direction so as to appear in need of counseling by a fictitious community mental health agency. Specifically, one group of respondents ($n_2$=39) was asked to present the worst possible picture of themselves (Maximum Fake-Bad), while another group ($n_3$=38) was instructed to create a negative test pattern, however taking precaution in their responses to avoid detection of deliberate falsification (Fake-Bad Modified). Complementary Maximum Fake-Good ($n_4$=42) and Fake-Good Modified ($n_5$=24) conditions presented the test as part of the application procedure for a fictitious job and required that the respondents create a favorable impression.

Five other experimental conditions utilized the standard testing procedure; however, examinees included in these conditions were instructed to respond "randomly" to pre-specified numbers of items on the answer sheet prior to receiving the test booklets.[2] Specifically, examinees in condition #1 ($n_1$=10) responded randomly to 10 items; examinees in condition #2 ($n_2$=9) responded randomly to 20 items; examinees in condition #3 ($n_3$=8) responded randomly to 30 items; examinees in condition #4 ($n_4$=8) responded randomly to 40 items; and examinees in condition #5 ($n_5$=8) responded randomly to 50 items. The response form used with the TSCS for each of these five conditions was constructed such that exactly 90% of the total number of random responses called for fell within the regions of the test defined by Fitts as the Positive Scores ($\underline{k}$=90). The remaining 10% of the random

responses fell within the Self Criticism scale ($k$=10). Persons included in these five conditions are collectively referred to as "sleepers" in subsequent portions of this paper.

Methodology

The methodology of multiple discriminant analysis was used to examine the nature of differences manifested in test profiles among the Standard, Fake-Good (2 groups) and Fake-Bad (2 groups) testing conditions. This approach to the problem of group differences provides a means of examining the interrelations of a given set of variables and may be used to classify an individual into one of several groups.

The test response patterns of persons included in the random response testing conditions were examined for implausibility utilizing the methodology of the Rasch measurement model. An analysis of the fit of items in the TSCS to the Rasch model was performed using program BICAL (Wright & Mead, 1977). An analysis of person fit to the model was accomplished using an algorithm provided by Wright and Stone (in press).

The Rasch model bases test calibration on two simple expectations: (1) the more able the examinee, the higher is the probability that s(he) will respond correctly to a given test item, and (2) that any examinee will be more likely to respond correctly to an easier item than a harder one (Wright & Stone, in press)[3]. When an observed test response pattern deviates significantly from these expectations, an algorithm provided by Wright and Stone (based upon the formulation of

the measurement model) may be used to determine how unexpected is a particular person or item record. This algorithm was used in an earlier study by Garrison and White (1979) to successfully identify all random responders included in a simulated data structure.

## RESULTS AND DISCUSSION

### Descriptive Analyses

Table 1 summarizes the subscale means and standard deviations computed from the test responses of persons included in each of the Standard, Maximum Fake-Good, Fake-Good Modified, Maximum Fake-Bad and Fake-Bad Modified testing conditions (designated A-E, respectively, for convenience). While analyses were performed on all of the non-overlapping score categories of the TSCS, Table 1 provides information only on the Self Criticism scale and the five Column scales[4] (see Fitts, 1965 for an extended discussion of the TSCS scoring categories). The Self Criticism scale is simply a measure of defensiveness. The Column scores purportedly reflect an external frame of reference within which an individual describes him/herself and, when summed, constitute the Total Positive score. Taken together, these six scores constitute the total test, represent major dimensions of self-perception and yielded the "best" linear combination of the various subscale combinations considered, providing maximal differentiation among the groups in question (A-E).

Insert Table 1 here

An examination of the information contained in Table 1 indicates statistically significant differences among the means obtained for the five groups on each of the six scales. For visual clarity, the information contained in Table 1 has been used in Figure 1 to illustrate the test profiles resulting from each of the five testing groups. The profiles illustrated in Figure 1 utilize Fitts' (1965) standard score units. That is, the means reported in Table 1 have been transformed into their T-score equivalents using Fitts' normative data.

Insert Figure 1 here

An examination of the profiles illustrated in Figure 1 indicates that the test patterns for the Standard and the Fake-Good conditions (2) fall within the normal limits established by Fitts (1965). Respondents in the Standard condition show much similarity, on the average, to Fitts' normative group. Instructions to respondents to fake-good but to try to avoid detection of deliberate falsification appeared to be quite effective in lowering the elevation of the test profile, as evidenced by the differences in profiles for the Maximum and Modified Fake-Good respondents. Neither of the Fake-Good profiles is erradic or excessively high. Moreover, the Modified Fake-Good profile shows very strong similarity to the profile provided by Fitts for a group

of 75 persons judged to be high in personality integration. Thus, it appears that the TSCS is susceptible to faking in instances where the respondent may wish to create a favorable impression of him or herself.

The profiles resulting from the Maximum and Modified Fake-Bad conditions fall well beyond the normal limits established by Fitts (1965). These two profiles are almost indistinguishable from each other, unlike the complementary Fake-Good profiles. Moreover, the Fake-Bad profiles fall well below that of a large group of psychiatric patients (n=369) described by Fitts, suggesting that the form of negative profiles obtained here may be characteristic of those which are intended to create a false negative impression.

Because the extent to which testwiseness enters into the test patterns of individuals desiring to create false impressions on the TSCS is typically unknown, Table 2 presents the test results obtained after collapsing groups B and C, and D and E, into the dichotomous conditions of Fake-Good and Fake-Bad, respectively. Table 2 is simply a means of presenting the subscale differences in terms of only <u>three</u> distinct groups.

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Insert Table 2 here

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Figure 2 presents a graphical display of the subscale means for these three groups of respondents. The profiles illustrated in Figure 2 do not alter the earlier conclusions with respect to the five different testing conditions. Rather, they serve to present pictures

of the "average" Fake-Good and Fake-Bad profiles relative to the profile obtained from the Standard testing condition.

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Insert Figure 2 here

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Having presented the test profiles of respondents included in the different testing conditions discussed above, the issue which naturally arises is the extent to which the various subscale scores of the differing groups vary in a statistical sense. While the differences among the groups may be examined in terms of each of the subscales taken singly, the danger of obtaining a distorted picture of the group differences tends to increase as the intercorrelations among the subscales become large. For this reason, the examination of group differences is better addressed in terms of multivariate analyses.

Discriminant Analyses

A stepwise multiple discriminant analysis was performed on the test data obtained from respondents included in the Standard, Maximum Fake-Good, Fake-Good Modified, Maximum Fake-Bad and Fake-Bad Modified testing conditions. For comparative purposes, discriminant analyses also were performed using the test data of respondents in the Standard, Fake-Good (collapsed) and Fake-Bad (collapsed) conditions. References in this section to "5 groups" and "3 groups" reflect the differences in sample structures indicated above.

The stepwise procedure sequentially selects variables into the analysis on the basis of their discriminating power. The analyses

reported here are based upon a linear combination of the Self Criticism and Column scales only, which resulted in greater accuracy of classification of persons into groups than did other linear combinations of variables studied. In all analyses, probabilities of group membership were equal for all individuals (i.e., no Bayesian adjustment was made for the differing sample sizes). The stepwise selection criterion used in the analyses was the overall multivariate F-ratio for the test of differences among the group centroids. The variable which maximizes the F-ratio also minimizes Wilks' lambda, which is a measure of group discrimination.

Table 3 summarizes for both five groups and three groups of respondents the order of entry of the Self Criticism and Column variables into the stepwise analysis, together with Wilks' lambda which provides a measure of overall separation of the groups at each step in the analysis. Wilks' lambda is tested for significance by an approximate F-test. An examination of the information contained in Table 3 indicates that all variables entered into the analyses (i.e., improving group separation at each step) and that the most discriminating variables were the Physical Self and Self Criticism scales for both analyses. Thereafter the specific order of entry of the variables differed for the separate analyses.

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Insert Table 3 here

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The discriminant analysis performed for the five groups yielded two discriminant functions, each of which was statistically significant at the .001 level. This was also the case for the three-group data structure. Table 4 presents the standardized discriminant function coefficients for the Self Criticism and Column scales on each of these two functions. Interpretation of these coefficients is analogous to the interpretation of beta weights in multiple regression. Moreover, when the sign is ignored, one is able to determine the relative contribution of the associated variable to a particular function.

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Insert Table 4 here

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An examination of the coefficients contained in Table 4 indicates that the first function appears to represent the Physical Self dimension (for both groups). The other Column variables by comparison are approximately equally discriminating, but contribute less to the function. The Self Criticism scale is found to contribute least to the first discriminant function.

The second function is less clear than the first and may be interpreted differently for the five-group and three-group data structures. In general, the second function appears to take on the aspects of the Self Criticism scale; however, other of the Column variables continue to add to the characteristics of this function.

In order to examine further the nature of the two functions discussed briefly above, Table 5 presents additional information bearing on the interrelations of the Self Criticism and Column variables. Specifically, Table 5 presents the within-groups correlation matrix of test variables resulting from analysis of the five-group data structure. The matrix resulting from the three-group analysis differed from that presented only slightly (not greater than .01 for any one correlation coefficient).

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Insert Table 5 here

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The coefficients reported in Table 5 indicate that the Column variables are highly related to each other, while the Self Criticism variable is somewhat independent of the Column variables. The coefficients reported in Table 5 compare favorably with the intercorrelations among the scales which were reported by Fitts (1965). Moreover, the results of this analysis tend to support a two-dimensional interpretation of the TSCS, namely self-concept and self criticism.

Figure 3 illustrates the group centroids of the five-group data structure determined from the mean discriminant scores for each group on the respective functions. The centroids simply serve to summarize the group locations in the space defined by the discriminant functions. The x-axis is defined by the first discriminant function and the y-axis is defined by the second function.

Insert Figure 3 here

An examination of Figure 3 indicates separation of the groups primarily in terms of the Physical Self scale on function #1. Again, function #2 is more difficult to interpret, but primarily differentiates the Maximum Fake-Good group from the other four testing groups. For comparative purposes, the group centroid for Fitts' (1965) standardization sample has been plotted from the normative data. It is interesting to note the similarity in first function location between Fitts' sample and the Standard condition in the present study.

Figure 4 illustrates the group centroids of the three-group data structure. Here also the first function serves mainly to differentiate among the groups in terms of the Physical Self variable. Function 2 remains complex, but serves to differentiate the groups more evenly than was the case in the five-group illustration.

Insert Figure 4 here

In order to test the adequacy of the derived discriminant functions, a series of classification equations were derived from the pooled within-groups covariance matrix and the centroids for the discriminating variables. The classification coefficients are multiplied by the raw score values, summed, and added to a constant. The end result of this process is that each test case will have k classification scores

(where k = the number of groups being differentiated), with the test case being classified into the group associated with the highest of the k scores computed.

Table 6 provides the classification equations for separation of the five respondent groups. Likewise, Table 7 provides the classification equations for the three-group data structure. These equations are provided here in the interest of cross-validation to other study samples and are in raw score (unstandardized) form.

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Insert Tables 6 and 7 here

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Table 8 provides the classification results based upon the discriminant analysis performed using five groups of respondents. An examination of the information provided in this table suggests that the discriminant functions derived effectively differentiate the Standard and Maximum Fake-Good groups from the others. Less accuracy of classification occurs with respect to the Fake-Good Modified group. Finally, while the Maximum Fake-Bad and Fake-Bad Modified groups are effectively separated from the other groups, considerable error exists in differentiating between the two Fake-Bad groups owing to the extreme overlap of their respective test profiles. The overall percentage of grouped cases correctly classified was 60.84.

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Insert Table 8 here

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Table 9 provides the classification results based upon three groups of respondents. Here, the prediction results are closer to expectation. The greatest number of misclassifications occurs with respect to members of the Fake-Good group (actually two groups collapsed) being classified into the Standard group. The overall percentage of grouped cases correctly classified was 80.26.

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Insert Table 9 here

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Rasch Analyses

In order to determine whether the test response patterns of persons included in the five "sleeping" conditions (n=43 total) were distinguishable (and detectable) from the test records of persons responding "normally" to the TSCS, the TSCS was calibrated using the Rasch measurement model. The Rasch model is a latent trait measurement model which bases test calibration upon the proposition that performance on a test is explainable simply in terms of two parameters: (1) an examinee's ability or position on some latent continuum, and (2) the difficulty of items scaled along the same continuum. Calibration of an instrument is accomplished by transforming person abilities (test scores) and item difficulties into a common metric where the estimates are additive. These estimates (expressed in log units) are then used to evaluate the fit of test items to the Rasch formulation, as well as to examine the response of each person to each item to determine

whether it is consistent with the pattern of responses observed for the group.

Given the interrelations among the Column scales discussed earlier, and the apparent independence of the Self Criticism scale from the Column scales, Rasch calibrations were performed separately for the Self Criticism and Columns (combined) scales. To accomplish the test calibrations, individuals' item responses were re-scored to fit a dichotomous scoring format. This was done by scoring item responses of 1, 2 and 3 as zero and responses of 4 and 5 as one, taking into account the directionality of specific items.

Table 10 summarizes some of the properties of the Self Criticism and Columns scales. The correlation coefficients reported under the column labelled "$r_{xy}$" are those between scores computed from Fitts' (1965) five-position response format and the dichotomous form of item scoring. Thus, it is apparent that there is little loss in the generality of test information when the simpler item scoring procedure is used. The coefficients reported under the column headed "$r_{xx}$" are internal-consistency estimates. The coefficient of .92 obtained from the combined Columns scale lends additional support to a unidimensional interpretation of the TSCS. While the internal-consistency of the Self Criticism scale appears to be much less than that of the Columns scale, such an interpretation must be tempered in view of the number of items comprising this scale. The figures reported in Table 10 are based upon analyses of the test records of respondents included in the Standard testing condition.

Insert Table 10 here

Calibration of the Columns scale using the Standard condition test data indicated that 82 of the 90 items contained in the scale met the criterion of fit to the Rasch model utilized in this study ($t < 3.0$, see Wright & Stone (in press) for a detailed discussion of the analysis of fit). The item and "ability" estimates derived from this calibration were then used to examine the implausibility of test cases included in the five sleeping conditions. Of the 43 persons (total) included in the five random response conditions (i.e., 10-50 random responses), 21 persons (49%) were identified as providing implausible test patterns. However, the number of random responses called for in each of the five conditions did not appear to be related to the number of cases identified as aberrant in each group. Four respondents from each of the 10, 20, 30 and 40-random items groups were identified, and five respondents were identified from the 50-items group. This finding suggests that knowledge of the particular items included in the random response sequence may be more important in the detection of implausible test patterns than the actual number of random responses. This is particularly true when one considers that, with a dichotomous form of item scoring, correct (or positive) responses have a probability of occurrence of .50 due to chance alone.

Calibration of the Self Criticism scale indicated that all of the items fit the Rasch model ($t < 3.0$). However, generalizations of

the "ability" and item difficulty estimates derived from the Standard testing condition data to the sleeping conditions failed to identify any implausible response patterns for this scale. The reasons for this finding remain unclear.

## CONCLUSIONS

This study began with the position that research in the area of self-concept has progressed little since Wylie's (1961) analysis of its methodological weaknesses. To the extent that empirical studies of the self-concept are based upon the ability to measure and describe its functioning, it is reasonable that attention should be focused on the measurement problems which continue to hamper progress in the field.

Based upon the findings of the present study, several conclusions appear to be warranted. First, the TSCS was found to be susceptible to faking in instances where the respondent may wish to create a favorable impression. However, faking in the negative direction was found to produce a test profile differing noticeably from that provided by psychiatric patients, making the detection of fake-bad profiles far simpler than the detection of those which have been faked in the positive direction.

Secondly, the detection of random response patterns among examinees appears to be complex. While the Rasch measurement model provides a means of addressing this problem in personality assessments, much work

remains in understanding the effectiveness of its application in a variety of testing situations.

Finally, some evidence was obtained suggesting that the TSCS may be less multi-faceted than previously described by Fitts (1965). The findings of the present study tend to support an interpretation of the TSCS based upon only two major dimensions, namely self-concept and self criticism. Similar interpretations have appeared elsewhere in the psychological literature (e.g., Rentz & White, 1967).

While studies of the influence of situational variables on personality inventories in general, and self-concept measures in particular, serve the useful function of broadening our understanding of the characteristics of such instruments when used with groups of examinees, it is suggested further that increased attention should be directed toward the study of individuals comprising such groups. The methodology utilized in the present investigation is directed toward the achievement of such a goal.

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## Footnotes

[1]The authors consider that their individual contributions to this study are of equal importance; order of authorship is alphabetic.

[2]In describing these groups of respondents, it should be noted that "random" responses refer to item responses generated without reference to item stimuli. Random in this instance, and in subsequent discussions in this paper, merely implies "without careful choice" and is to be distinguished from the statistical concept of random pertaining to the probability of occurrence of events.

[3]The choice of the term "able" here is consistent with the application of the measurement model to cognitive assessments. In the affective domain, "ability" should be interpreted simply as a person's measure on some latent variable (in this instance self-concept). Similarly, references to item "difficulty" are translated to the affective domain as percentages of item endorsement.

[4]The Column scales are defined specifically as the Physical Self, Moral Self, Personal Self, Family Self and Social Self (Fitts, 1965).

Table 1

Means and Standard Deviations for Six Scoring Categories of the TSCS for Five Groups of Respondents

| Scales | Groups[a] A (n=166) | B (n=42) | C (n=24) | D (n=39) | E (n=38) | Univariate F (df=4,303) |
|---|---|---|---|---|---|---|
| Self Criticism | 37.25 (5.89)[b] | 29.12 (6.11) | 34.75 (6.47) | 39.23 (9.68) | 40.45 (5.40) | 19.73* |
| Physical Self | 70.17 (7.66) | 79.24 (7.66) | 75.17 (9.37) | 37.33 (17.90) | 36.47 (10.53) | 188.95* |
| Moral Self | 74.01 (7.93) | 80.38 (6.42) | 74.67 (6.68) | 42.56 (18.29) | 42.92 (12.12) | 151.84* |
| Personal Self | 67.81 (8.05) | 76.62 (6.71) | 71.08 (9.21) | 36.59 (17.84) | 37.42 (10.17) | 161.51* |
| Family Self | 72.12 (9.36) | 77.95 (6.36) | 76.17 (7.45) | 41.05 (17.49) | 40.53 (10.65) | 145.38* |
| Social Self | 70.83 (8.70) | 77.33 (8.10) | 73.79 (8.91) | 37.77 (16.06) | 41.55 (11.21) | 153.34* |

*$p < .001$

[a]Groups A, B, C, D and E correspond to Standard, Maximum Fake-Good, Fake-Good Modified, Maximum Fake-Bad and Fake-Bad Modified testing conditions, respectively.

[b]Figures reported in parentheses are standard deviations.

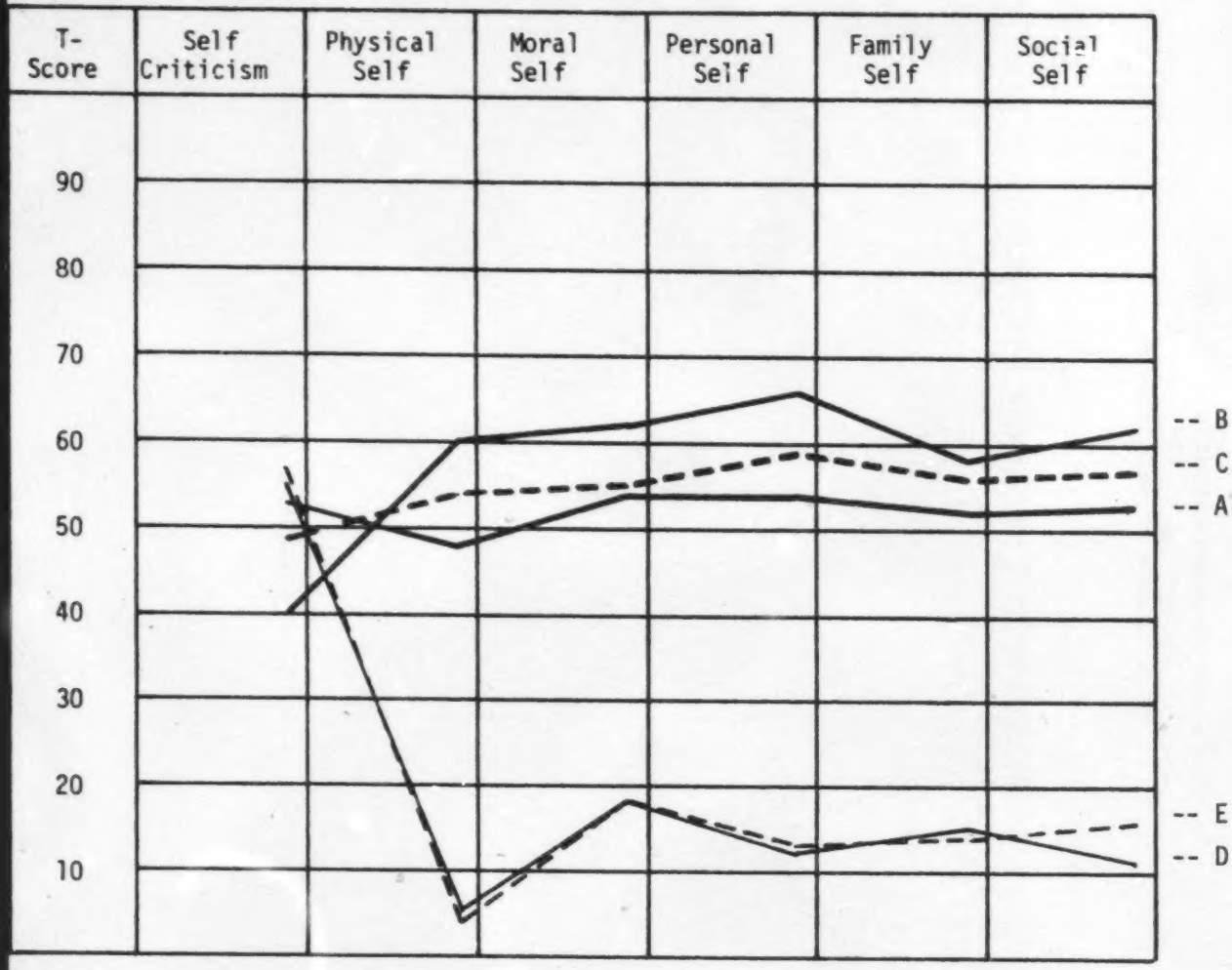


Figure 1. Test profiles of five groups of respondents.

Table 2

Means and Standard Deviations for Six Scoring Categories of the TSCS for Three Groups of Respondents

| Scales | Groups[a] A (n=166) | B + C (n=66) | D + E (n=77) | Univariate F (df=2,306) |
|---|---|---|---|---|
| Self Criticism | 37.25 (5.89)[b] | 31.17 (6.77) | 39.83 (7.84) | 32.31* |
| Physical Self | 70.17 (7.66) | 77.76 (8.48) | 36.91 (14.64) | 375.73* |
| Moral Self | 74.01 (7.93) | 78.30 (7.04) | 42.74 (15.45) | 298.44* |
| Personal Self | 67.81 (8.05) | 74.61 (8.10) | 37.00 (14.48) | 317.71* |
| Family Self | 72.12 (9.36) | 77.30 (6.78) | 40.79 (14.43) | 291.94* |
| Social Self | 70.83 (8.70) | 76.05 (8.51) | 39.64 (13.92) | 301.94* |

*$p < .001$

[a]Groups A, B + C and D + E correspond to Standard, Fake-Good (collapsed) and Fake-Bad (collapsed) testing conditions, respectively.

[b]Figures reported in parentheses are standard deviations.

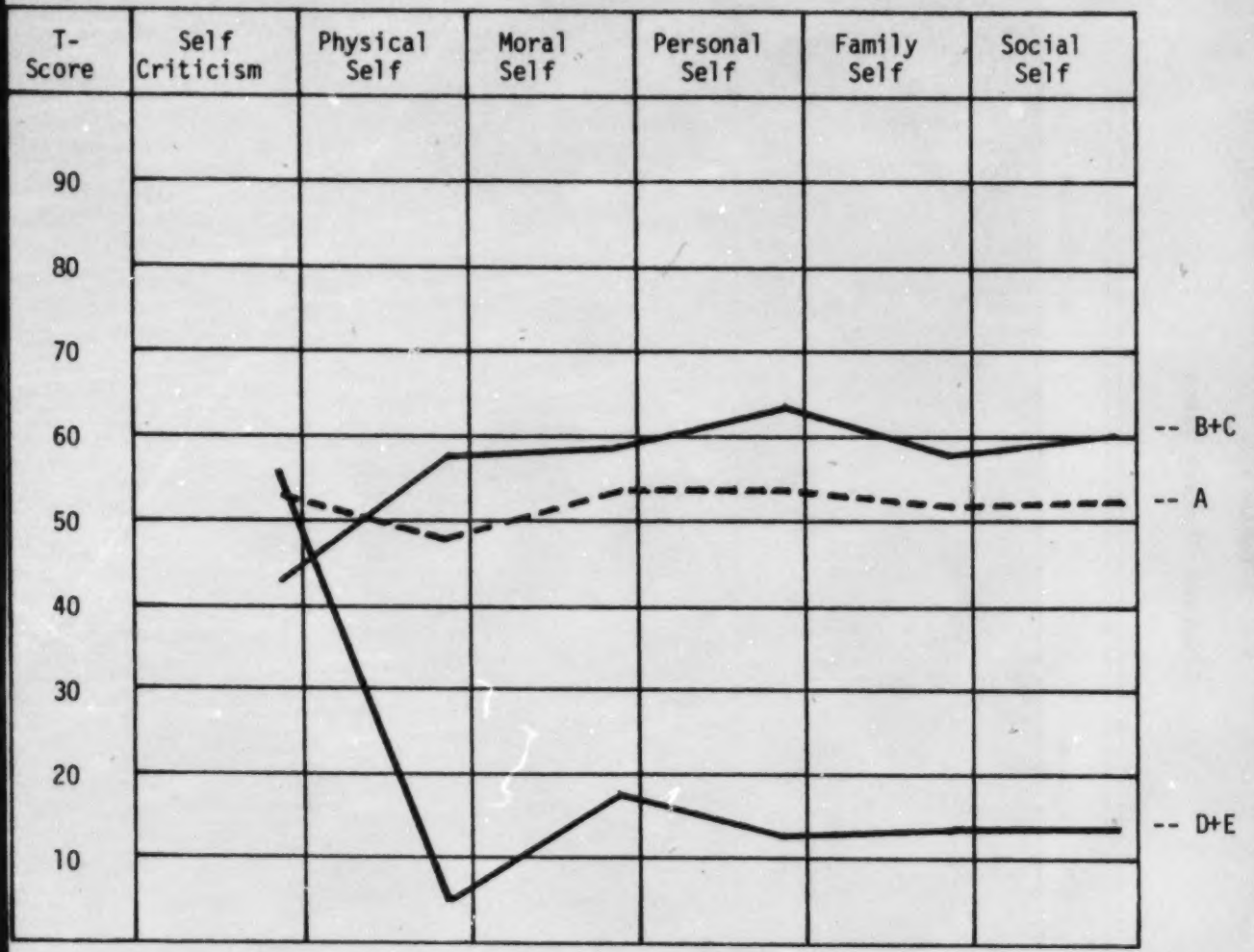


Figure 2. Test profiles of three groups of respondents.

Table 3

Stepwise Summary Table

| 5 - Groups | | | 3 - Groups | | |
|---|---|---|---|---|---|
| Step Number | Variable Entered | Wilks' Lambda | Step Number | Variable Entered | Wilks' Lambda |
| 1 | PHYS | .287* | 1 | PHYS | .289* |
| 2 | SC | .251* | 2 | SC | .262* |
| 3 | SOC | .229* | 3 | MOR | .241* |
| 4 | MOR | .220* | 4 | PERS | .236* |
| 5 | FAM | .216* | 5 | SOC | .233* |
| 6 | PERS | .212 | 6 | FAM | .232 |

* $p < .001$

Table 4

Standardized Discriminant Function Coefficients

| | 5 - Groups | | 3 - Groups | |
|---|---|---|---|---|
| Scales | Function 1 | Function 2 | Function 1 | Function 2 |
| SC | -.07181 | -.97780 | -.08340 | .95404 |
| PHYS | -.51744 | .46469 | -.52330 | -.60933 |
| MOR | -.15695 | -.55384 | -.14771 | 1.02870 |
| PERS | -.14420 | .81930 | -.13035 | -.74632 |
| FAM | -.09523 | -.63181 | -.11596 | .43844 |
| SOC | -.14876 | -.49861 | -.14965 | .27250 |

Table 5

Within-Groups Correlation Matrix

| Scales | PHYS | MOR | PERS | FAM | SOC |
|---|---|---|---|---|---|
| SC | -.29 | -.29 | -.31 | -.28 | -.26 |
| PHYS | | .69 | .73 | .70 | .70 |
| MOR | | | .77 | .72 | .73 |
| PERS | | | | .77 | .77 |
| FAM | | | | | .72 |

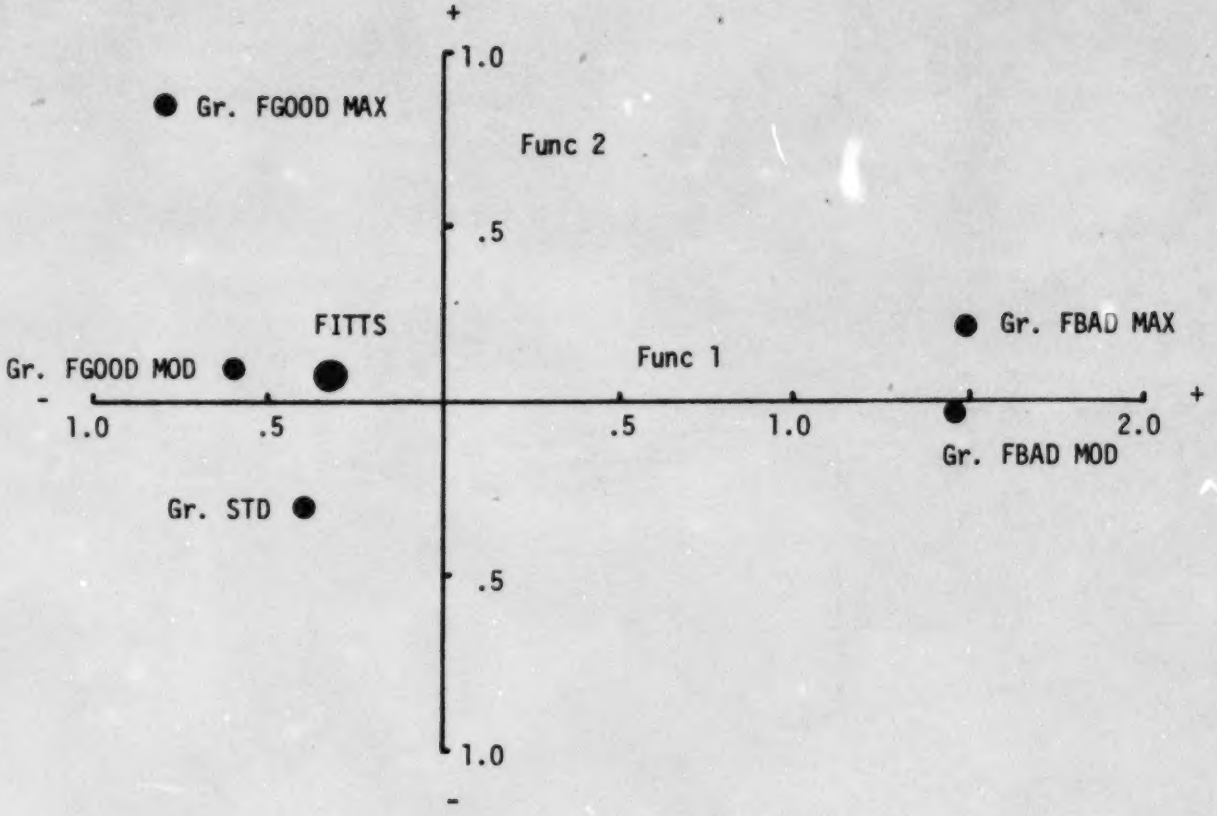


Figure 3. The five group centroids in the discriminant-function space.

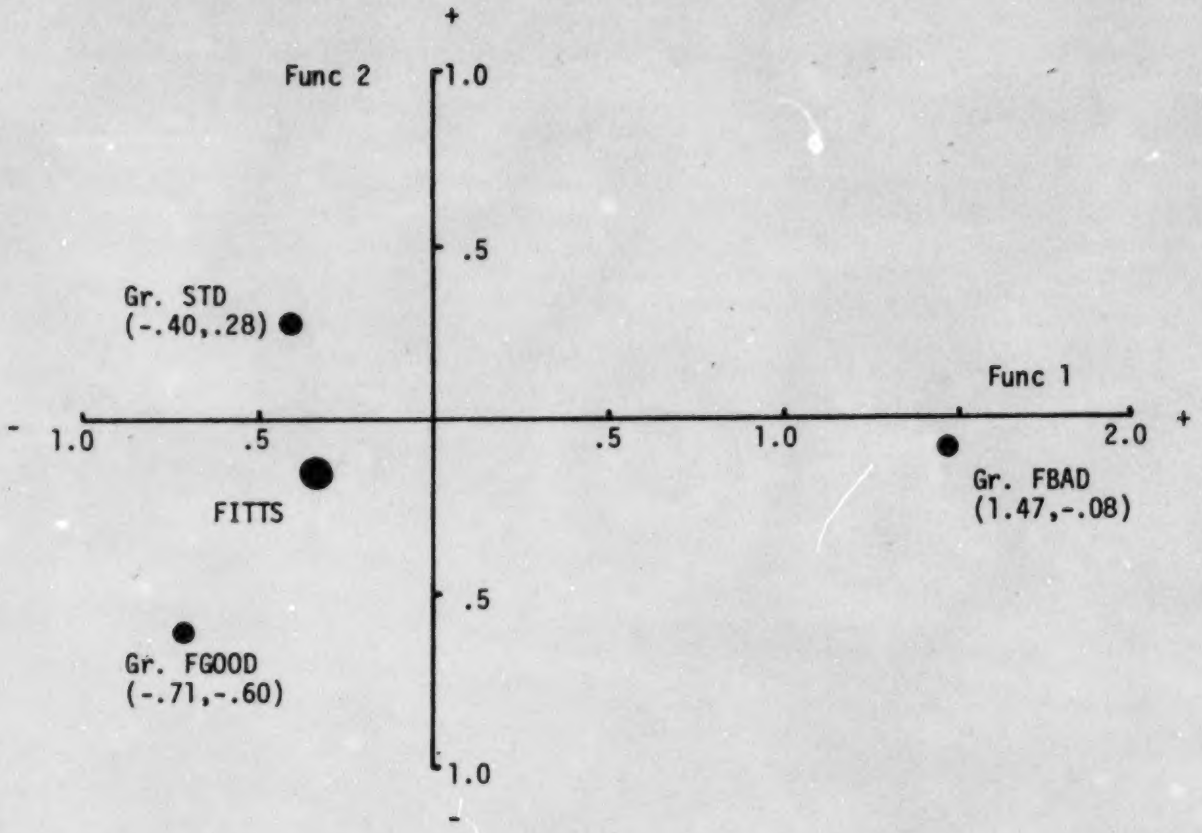


Figure 4. The three group centroids in the discriminant-function space.

Table 6

Classification Equations for Five Groups of Respondents

| Groups | Classification Equations |
|---|---|
| Standard | $C_1$ = 1.424 SC + .362 PHYS + .380 MOR + .100 PERS + .212 FAM + .165 SOC - 70.189 |
| Maximum Fake-Good | $C_2$ = 1.259 SC + .429 PHYS + .354 MOR + .177 PERS + .163 FAM + .152 SOC - 68.556 |
| Fake-Good Modified | $C_3$ = 1.379 SC + .426 PHYS + .301 MOR + .111 PERS + .244 FAM + .169 SOC - 70.645 |
| Maximum Fake-Bad | $C_4$ = 1.280 SC + .200 PHYS + .302 MOR + .059 PERS + .181 FAM + .045 SOC - 40.878 |
| Fake-Bad Modified | $C_5$ = 1.311 SC + .156 PHYS + .287 MOR + .064 PERS + .141 FAM + .153 SOC - 42.746 |

Table 7

Classification Equations for Three Groups of Respondents

| Groups | Classification Equations |
|---|---|
| Standard | $C_1$ = 1.413 SC + .371 PHYS + .392 MOR + .108 PERS + .208 FAM + .150 SOC - 70.314 |
| Fake-Good | $C_2$ = 1.296 SC + .436 PHYS + .344 MOR + .159 PERS + .191 FAM + .144 SOC - 69.431 |
| Fake-Bad | $C_3$ = 1.278 SC + .185 PHYS + .308 MOR + .073 PERS + .152 FAM + .083 SOC - 41.540 |

Table 8

Prediction Results for Five Groups of Respondents

| Actual Group[a] | No. of Cases | Predicted Group Membership: Group A | Group B | Group C | Group D | Group E |
|---|---|---|---|---|---|---|
| A | 166 | 110 (66.3)[b] | 23 (13.9) | 31 (18.7) | 1 (0.6) | 1 (0.6) |
| B | 42 | 4 (9.5) | 28 (66.7) | 10 (23.8) | 0 (0.0) | 0 (0.0) |
| C | 24 | 8 (33.3) | 7 (29.2) | 9 (37.5) | 0 (0.0) | 0 (0.0) |
| D | 39 | 0 (0.0) | 2 (5.1) | 2 (5.1) | 15 (38.5) | 20 (51.3) |
| E | 38 | 1 (2.6) | 0 (0.0) | 0 (0.0) | 11 (28.9) | 26 (68.4) |

[a]Groups A, B, C, D and E correspond to Standard, Maximum Fake-Good, Fake-Good Modified, Maximum Fake-Bad and Fake-Bad Modified testing conditions, respectively.

[b]Figures in parentheses are percentages of cases classified into the different groups.

Table 9

Prediction Results for Three Groups of Respondents

| Actual Group[a] | No. of Cases | Predicted Group Membership: Group A | Group B | Group C |
|---|---|---|---|---|
| A | 166 | 131 (78.9)[b] | 33 (19.9) | 2 (1.2) |
| B | 66 | 20 (30.3) | 46 (69.7) | 0 (0.0) |
| C | 77 | 4 (5.2) | 2 (2.6) | 71 (92.2) |

[a]Groups A, B and C correspond to Standard, Fake-Good (collapsed) and Fake-Bad (collapsed) testing conditions, respectively.

[b]Figures in parentheses are percentages of cases classified into the different groups.